

Acknowledgements

The authors wish to thank colleagues who assisted with the setting and checking of snares during the marking programme. We are also grateful to Mr. A. H. C. CHRISTIE and Dr. E. E. SPURR for comments on the script.

Zusammenfassung

Halsbandmarkierungen von Gemsen in Neuseeland

In der Zeit zwischen 1973 und 1977 konnten in den Südalpen von Neuseeland 220 Gemsen in Schlingenfallen mit Halsbändern, die sich selbsttätig anheften, versehen werden. Diese Markierungsmethode soll Einblicke in die Bestandgröße und -zusammensetzung sowie in Reviernutzung und Wechselgewohnheiten ermöglichen. Die Halsbandfallen wurden in steilem, alpinem Gelände gesetzt. Der Markierungserfolg lag monatlich zwischen 3% und 6% bezogen auf die Gesamtzahl der gestellten Fallen. Diese wurden, soweit in der Zwischenzeit ausgelöst, in monatlichem Abstand neu gestellt. Ausgewachsene Böcke wurden hauptsächlich in den Wintermonaten gezeichnet, Weibchen und Jungtiere häufiger während der Sommermonate. Der Markierungserfolg entsprach in den verschiedenen Altersgruppen und Geschlechtern deren Anteil an der Population. Er zeigte sich vom Wetter, von der Wachsamkeit der Gemsen gegenüber den Fallen und von der jahreszeitlich bedingten unterschiedlichen Besuchshäufigkeit an den Fallen beeinflusst. Gekennzeichnete Einzeltiere streiften über eine Weite bis zu 42 km Luftlinie.

Literature

- AHLEN, I. (1965): Studies on the red deer, *Cervus elaphus* L., in Scandinavia. III. Ecological investigations. *Viltrevy* 3, 177—351.
- KEITH, L. K. (1965): A live snare and a tagging snare for rabbits. *J. Wildl. Mgmt.* 29, 877—880.
- MURDOCH, C. A. (1971): A history of the syringe weapon. *Review* 21, 22—30.
- ROMANOV, A. N. (1956): Automatic tagging of wild animals and the prospects for its use. *Zhur* 35, 1902—1905. (Transl. Canadian Wildl. Serv., Ottawa).
- TAYLOR, R. H. (1969): Self-attaching collar for marking red deer in New Zealand. *Deer* 1, 404—407.
- VERME, L. J. (1962): An automatic tagging device for deer. *J. Wildl. Mgmt.* 26, 387—392.

Authors' address: C. M. H. CLARKE and R. J. HENDERSON, Protection Forestry Division, Forest Research Institute, P. O. Box 31—011, Christchurch, New Zealand

WISSENSCHAFTLICHE KURZMITTEILUNGEN

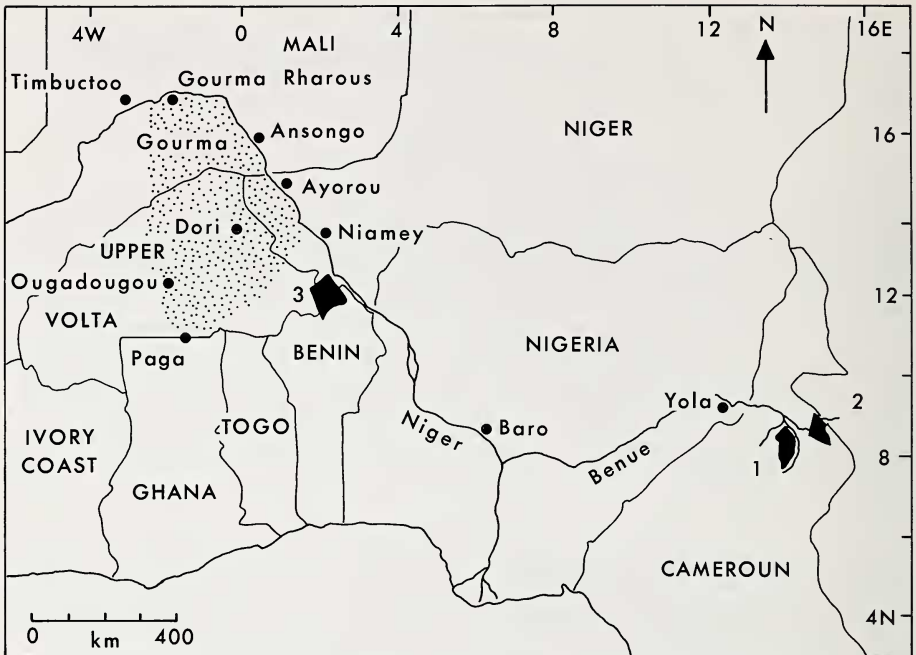
Giraffe south of the Niger-Benue river system

By D. C. D. HAPPOLD

Department of Zoology, University of Ibadan, Nigeria

Receipt of Ms. 2. 12. 1977

In earlier papers (HAPPOLD 1969, 1973a, b), I showed that giraffes (*Giraffa camelopardalis peralta* Thomas, 1898) are rare or uncommon in many localities north of the Niger-Benue river system from about 8° — 18° N, and that they have not become established in what appears to be suitable savanna within the same latitudes south



Map of West Africa to show localities cited in the text. The dispersion area of giraffes south of the Niger river is indicated by stippling. 1 = Parc National de la Bénoué; 2 = Parc National du Boubandjihad; 3 = Parc National du W.

of the rivers. This paper describes two interesting exceptions to this generalised distribution pattern. The first exception concerns giraffes living in the watershed region of the Benue river, and the second is related to the ability of giraffes to cross the Niger river in the Sahel region during times of drought and low rainfall.

The Benue and several of its tributaries originate in the Adamaoua highlands of Cameroun and flow northwards before turning westwards into Nigeria. There are about 100 giraffes in the Parc National de la Bénoué, which is situated south of this westward curve of the Benue river and whose eastern boundary is along the Benue river (J. DUBREUIL quoting P. FLIZOT, in litt., HAPPOLD 1973b). Also within the watershed of the Benue and its tributaries is the Parc National du Boubandjihad, about 75 km east of the Parc National de la Bénoué, where there are about 250 to 300 giraffes (J. DUBREUIL, *op. cit.*). Although these giraffes are already south of the Benue, there is a belt of hilly and mountainous country along the Cameroun-Nigerian border, almost as far as Yola on the Benue river, which probably prevents the dispersion of giraffes into Eastern Nigeria from the Benue watershed. There are no records of giraffes from Eastern Nigeria.

The distribution of giraffes along the north bank of the Niger river is irregular. The largest populations, probably about 5500 individuals (S. MOUSSA in POCHÉ 1976), are within 20–30 km of the river between Ansongo (Mali), Ayorou and Niamey (Niger). However, there is some evidence that giraffes are becoming less common in this region (JONES 1973) even though they are unmolested by local people and are often seen near villages (C. GEERLING, *pers. comm.*). There are few, if any, giraffes between Niamey and the Nigerian border, and in Nigeria itself. To the west of the Ansongo-Niamey populations there are records of small populations where the Niger

reaches its highest latitude (17° N) near Timbuctoo, but there are virtually no records of giraffes between the flood swamps south-west of Timbuctoo and the headwaters of the Niger in the Guinea Highlands.

Earlier (HAPPOLD 1969), I postulated that the Niger river prevented the dispersion of giraffes into the savannas south of river, but subsequently there have been four southern records (Table) which suggest that the river can be crossed when conditions are suitable although no one, as far as I know, has ever seen this happening. Having crossed the river, giraffes disperse into an area which appears to be clearly defined (Fig.): they have not been recorded from the surrounding areas which include the Parc National du W in southwest Niger (HAPPOLD and PHILP 1971; POCHÉ 1976). Benin (formerly Dahomey) (RAYNAUD and GEORGY 1969), western Nigeria (HAPPOLD 1973b; CHILD 1975), Ghana (CANSDALE 1948) or Ivory Coast (ROURE 1962). It is said that giraffes were relatively common in the savanna between northern Ghana and Ougadougou earlier this century, but there are no definite records of this.

If all the giraffes seen south of the Niger originated north of the river, it seems probably that the crossings were made somewhere east of Timbuctoo and west of Niamey where the northern populations are comparatively large. Furthermore, there should be a correlation between the occurrence of giraffes south of the river and factors such as low water levels in the river, the existence of useful sandbanks, and food shortages in the north. Unfortunately, ecological records in this region are almost non-existent, and the hydrology of the Niger is so complicated that it is not possible to make exact extrapolations from the data which is available. Nevertheless a general indication of the conditions prevailing over the last 60 years can be gleaned from the following data:

1. Rainfall in the Sahel region was particularly low in 1912–14, 1926, 1946–48, and 1972–73 (TANAKA et al. 1975).
2. At Baro in Nigeria, the lowest low water levels (depth less than 30 cm [12 in]) were recorded in 1915, 1917, 1920–22, 1938, 1945, and 1971–73, although the levels in the last period were masked by the Kainji Dam which was completed in 1968 (Nigerian Federal of Transport, Inland Waterways Division).

Observations of giraffes south of the Niger river

Year	Locality	Approximate distance to Niger river (km)	Notes and references
1948–49	North of Ghana-Upper Volta border near Paga, 10 km north of Navrongo (10.51 N, 01.03 W), Ghana	400	'small herd' (MORGAN 1969)
1969–71	Markoye, 70 km N. of Dori (14.03 N, 00.02 W), Upper Volta	80	'occasional' (P. D. MICKELSEN, in litt.)
1973	Gorom-Gorum, 50 km N. of Dori (14.03 N, 00.02 W), Upper Volta	120	About 5 individuals (P. D. MICKELSEN, in litt.)
1973–74	Gourma region of Mali, extending south to the Upper Volta border	0-240	Largest herd near Gourma Rharous (16.58 N, 01.50 W) contained about 20 individuals (J. A. SAYER, in litt.)

From these data it seems likely that the water level in the Niger was low enough upstream from Niamey for giraffes to cross during several months of the year in about 1914–15, 1920–22, (possibly 1938), 1945–47, and 1971–73. The first observations of giraffes in 1971–73 were in April to July, the months when the river level in this part of the Niger river is at its lowest. There is no evidence, as yet, that giraffes crossed the river during the first three time periods, but there is definite evidence (Table) for the last two periods.

Although giraffes have been seen occasionally south of the Niger river, there is no evidence that permanent populations occur in this area, and presumably the giraffes either die or return to the northern side. The southern habitats may be unsuitable for two reasons. First, human harassment and habitat modification may prevent the establishment of viable "southern herds". Secondly, there may be an absence or inadequacy of particular food plants or some other environmental requirement. These speculations emphasise the necessity of a thorough ecological study if, at some time in the future, conservation authorities wish to translocate giraffes into the savannas south of the Niger-Benue river system.

Acknowledgements

I am grateful to numerous correspondents who sent me information on the distribution of giraffes in West Africa, to the Nigerian Federal Ministry of Transport (Inland Waterways Division) for data on the water levels in the Niger river, and to the University of Ibadan who supported my research on West African mammals.

References

- CANSDALE, G. (1948): Provisional checklist of Gold Coast mammals. Accra: Government Printer.
- CHILD, G. (1974): An ecological survey of the Borgu Game Reserve. FAO, Rome, FI:SF/NIR 24. Technic. rep. 4.
- HAPPOLD, D. C. D. (1969): The present distribution and status of the giraffe in West Africa. *Mammalia* 33, 516–521.
- (1973a): The distribution of large mammals in West Africa. *Mammalia* 37, 88–93.
- (1973b): Large mammals of West Africa. London: Longmans.
- HAPPOLD, D. C. D.; PHILP, B. (1971): The National Parks of Northern Dahomey. I. Niger, *Fld.* 34, 182–187. II, *Ibid.* 35, 39–44.
- JONES, D. M. (1973): Destruction in Niger. *Oryx* 12, 227–233.
- MORGAN, D. (1969): Giraffes in West Africa. *Oryx* 10, 30.
- POCHÉ, R. M. (1976): Seasonal distribution and reproduction in Artiodactyla from South-western Niger. *Niger. Fld* 51, 31–40.
- REYNAUD, J.; GEORGY, G. (1969): Nature et chasse au Dahomey. Dahomey: Cotonou.
- ROURE, G. (1962): Animaux Sauvages de Côte d'Ivoire. Abidjan.

Author's address: Dr. D. C. D. HAPPOLD, Department of Zoology, The Australian National University, Canberra, ACT. 2600. Australia